

In the Matters of)
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FCC Docket No. **RM-11305**
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Petition for Spectrum Deregulation in)
the Amateur Service)
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Amendment of Part 97 of the)
Commission's Rules Governing the)
Amateur Radio Service)
FCC Docket No. **RM-11306**
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Concerning Permitted Emissions and)
Control Requirements)
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By W. Lee McVey)
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PG-12-19879)
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To: The Chief, Wireless
Telecommunications Bureau

INTRODUCTION AND DISCUSSION

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Neither the Communications Think Tank (CTT) nor the National Association for Amateur Radio (ARRL) made a substantial case for the necessity for such an extensive change in regulation methodology.

Although both speak to the advantage of having greater flexibility in use of spectrum allotted, neither makes a solid case for greater flexibility. CTT has, though, made a significant point in challenging mode-based assignment equity based upon observed utilization by mode across most HF bands.¹

2. Both speak of significantly increased digital mode utilization on the HF bands, yet CTT's survey shows only 5.9 percent of its survey-observed communications being digital. Very little usage for so much concern. And, no distinction was made between bandwidths and types of digital modes observed. Specifically, whether or not they were less than the 500 or 1000Hz of bandwidth now permitted for FSK modes.² ARRL has publicly endorsed the "Win-Link 2000" system, and employment of Pactor III, a digital mode that reportedly utilizes approximately 2.4kHz of bandwidth, for use on the HF bands.³ Use of Pactor III at HF, while appearing to meet regulations since it is not FSK, certainly goes well beyond what it appears the Commission had originally intended for bandwidth maxima for HF digital

¹ RM-11305, "An Analysis of Band Occupancy by Mode" by Art Pightling, K3XA, Appendix A

² 47CFR307(f)(3),(4)

³ Various ARRL Publications and Bulletins. Also, RM-11306, Paragraph 10 at p.8

operation. Earlier Pactor I and II versions that are still widely used (and used also with WIN-Link 2000) fully meet either 500Hz or 1000Hz bandwidth maxima. ARRL boldly goes on to say that Commission regulations *already permit* HF digital emissions with greater bandwidth than the 500Hz and 1000Hz included at 47CFR97.307f(3-4), as applied in 47CFR97.305c.⁴

Perhaps an un-intended oversight by the Commission when the regulations were promulgated. The only un-ambiguous, existing bandwidth restrictions on HF digital operation apply to the automatic digital operation provisions at 47CFR97.221, properly limiting these emissions, regardless whether FSK or not, to not more than 500Hz bandwidth. It would appear that the Commission's original intent, based on this all-inclusive limit in 47CFR97.221, that it had intended to limit not just FSK, but *all* digital modes to narrow bandwidths to conserve HF spectrum. In fact, it makes perfect sense that below 28MHz, digital bandwidth of any kind should be limited to either 500Hz or 1000Hz bandwidth in order to conserve sparsely available spectrum for other, non-compatible mode uses. Exclusive of the channeled 60 Meter Band, only about 2050 kHz is allotted to the amateur service. The amateur service allocation at 28MHz, itself 1700kHz, closely approaches *the entire allocation* for all HF bands below it.

HF spectrum should be conserved, as it is a precious and strategic resource. Encouraging the deployment of wide-band, automated digital operations

⁴ RM-11306 pp.13 at p.11

across such limited spectrum would reduce the usable spectrum available to all amateurs. And, during emergencies, the automatic operation of these stations, if distributed throughout HF bands, may actually impede necessary and important communications by initiating strings of transmissions to attempt connections with other automated digital stations. And, even if such automated stations were to transmit if no other transmissions were detected at the time they initiate, the effects of propagation may prevent them from hearing other stations actively transmitting at the same time. The Commission should maintain its present 500 and 1000Hz bandwidth limitations for HF digital modes, and clarify 97.305 to apply to *all* digital modes, whether FSK or not. Any allowed automatic operation should be confined within bandwidth segments not exceeding 1000Hz. Also, there is little justification for the addition of a narrower bandwidth yet, 200Hz. It only further complicates the regulation and re-allocation process and serves little purpose, since many amateur receiver passbands are not sufficiently selective below 500Hz anyway.

3. Any proposal to regulate spectrum by bandwidth (RB) should propose a technical definition of just what is meant by bandwidth. Neither Petitioner did. Should it be bandwidth in the classic sense, i.e., half-power or -3dB points at the respective edges of the desired bandwidth? I would think not. Some definition of absolute passband width must be part of any meaningful

discussion so as to address spectrum utilization in a practical manner and not be concerned with adjacent channel interference. Besides digital modes already noted, regulations now define only out-of-amateur-band emissions to not exceed quantified levels, based upon the age of the transmitter or just say that transmissions must use the minimum bandwidth necessary.⁵ Perhaps requiring bandwidth-edge signal levels to be at least 20dB below the mean power at the center of each passband would be a good starting point.

4. Neither Petition addressed the complicity of spectral assignment by license privilege sufficiently in their recommended spectrum allocations. Both simply copied existing license class spectrum privileges. In an RB proposal, some thought should be given to not just how much spectrum is allotted to each class of license, but how much bandwidth as well. Is wider bandwidth a privilege? The Petitioners certainly must think so to be so concerned about the value of new, yet-to-be-developed digital modes. If the Petitioners believe that to be the case, perhaps, then, it follows that entry-class licensees should be restricted to only the most-narrow, 500 and 1000Hz bandwidth segments, except as the Technician Class license now allows at VHF and above. Of course, any “re-farming” of spectrum, as I suggest later, should involve adjustments by license class, unless, of course, the Commission wishes to eliminate privilege differentiation between the various classes of licensees.

⁵ 47CFR97.307e

5. Neither Petitioner mentioned what is presently available to accommodate the experimenter. Existing Amateur Service spectrum and bandwidths permitted at 50MHz and above are certainly sufficient to accommodate any wide-bandwidth experimental modes. Especially since most of the bands offer six to ten times the spectrum available below 28MHz. And, if that weren't enough, the Commission's Special Temporary Authority and Experimental License privileges offer the flexibility for Amateur Service modes and frequencies that will not reasonably accommodate development. And, of course, 47CFR15.201, *Et. Seq.* allows low power experimentation and development.

RB PROPOSAL TO RESTACK HF BANDS BASED UPON UTILIZATION

6. CTT made a laudable study of most HF amateur band use by mode.⁶ As such, their proposal should have included recommendations based upon the results of the data. None was. Examining their data, 241.5 CW, 423 SSB, and 42 Digital communications were observed over an extended time period. Using this data, and assuming bandwidths of 500Hz, 1kHz and 3.5kHz for simplicity, a usage-weighted, channelized algorithm can be used to allot bandwidth by observed use throughout the HF spectrum. The VHF,

⁶ RM-11305, "An Analysis of Band Occupancy by Mode" by Art Pightling, K3XA, Appendix A

UHF and SHF spectrum have sufficiently-wide bandwidth segments and spectrum and were not included in the calculations in the Appendix. Using present HF bands, the algorithm was applied and the results are tabulated in Tables I and II. No accommodation was included for double-sideband AM or narrow-band FM, as both should be considered for use at 29MHz and above.

An argument can and should be made for re-farming HF spectrum, since in most all aspects of society, resources are applied based on need, or at least perceived need, as part of design criteria development. Albeit the number of lanes in a given roadway design, or the diameter of a domestic water main. The Amateur Radio Service spectrum should be allocated similarly, based on perceived need and utilization by licensees.

CONCLUSIONS AND RECOMMENDATIONS

7. Based on data provided by CTT, HF bands should be reallocated according to mode utilization. This could be done by simply examining usage by mode, and adjusting mode segments or creating bandwidth segments accordingly, based on that usage. I have used the CTT data and have developed a suggested allocation arrangement in Table II of my Appendix.

The suggestion that there is insufficient flexibility in present Amateur Service allotments to encourage development of new modes is patently false. The Commission has provided the flexibility in its current regulations to allow this.⁷ If not at HF, it clearly has at VHF and higher bands. These bands offer ample bandwidth, relatively short propagation distances and smaller antenna size, being more desirable and flexible for experimentation and development, anyway. HF spectrum should retain the relatively narrow bandwidths already permitted for non-voice telecommunications since very little spectrum is available when compared to VHF and higher bands. Development of new modes should be encouraged to be as spectrum-efficient as possible, limiting HF digital bandwidth to not more than 1kHz as a design constraint, with automatic digital operation constrained to 1kHz mode segments. Development of higher-throughput, narrowband modes within these constraints should be encouraged.

ARRL proposes many revisions to existing regulations, most of which would not benefit the public or the Amateur Service as a whole. A very small segment of amateur operators, apparently desirous of utilizing HF digital telecommunications to access enhanced internet content while travelling to avoid payment for similar commercial satellite-based services would be benefited by adoption of the ARRL proposal at the expense of other amateurs. There are many good reasons for clarifying and maintaining the status quo

⁷ 47CFR97.305 (c) incorporating 47CFR307 (f)(1-7)

with respect to HF digital telecommunications bandwidth. For one, Commission regulations that require public disclosure via publication in recognized journals of proposed digital protocols help protect the United States from those seeking to harm us via use of clandestine digital telecommunications.⁸ If anything, existing regulations should be revised to require submission of any new, proposed digital protocols to the Commission prior to permitted use in telecommunications, Amateur or otherwise.

8. There appears to be an illogical, *over-exuberance* on the part of the ARRL for RB. Perhaps, based in part upon its endorsement and use of Pactor-III via digital robots as a means to access the Internet and for wide-bandwidth, high-speed multimedia content on the amateur bands in general.⁹ ARRL's suggested bandwidth changes fly in the face of its interest in band-planning, especially at VHF and above.¹⁰ Its RB proposals for VHF and above would all-but-obliterate the frequency coordination work of scores of Amateur groups that have successfully coordinated scores of repeater and remote base stations in the Amateur Service. Stacking 100kHz bandwidth uses across most of the spectrum now used for narrow-band, 15kHz bandwidth FM activity could create a chaotic environment, crippling repeater systems. Many of which are used in public safety emergencies and other

⁸ 47CFR97.309 (a)(4)

⁹ The ARRL *Letter*, Volume 25, Number 4, January 27, 2006

¹⁰ The ARRL *Repeater Directory*, 2000-2001 Edition, pp.38-57.

useful public service activities. Overlaying proposed 100kHz bandwidth across spectrum already coordinated for narrow-band FM repeater systems makes absolutely no sense whatsoever.

9. The ARRL, in and of itself should not be considered the spokesman for the collective majority of United States licensed Amateur Radio Operators in this matter, since its instant Petition affects *all* United States amateur operators and *far less than half are members* of the ARRL. I, for one, am a member, but do not agree with the position of the ARRL with respect to its submission and serves to explain the basis for this submittal. Also, even though the ARRL solicited comments from its membership with respect to RB well in advance of its Petition filing, the member comments were never published or even posted for review on its Internet web site or published in its monthly QST magazine. So, we, as members, have *no idea* whether the majority of the ARRL membership favors the proposal or not. Certainly, we are told that the majority of its *ad-hoc digital committee* does. My own sense, based on commentary posted publicly on amateur radio internet sites QRZ.COM and EHAM.NET, is that the majority of amateur operators do not approve of the Petition filing in its present form. Amateurs were not asked if they agree with the CTT Petition either. If the ARRL is truly so concerned about the future direction of the Amateur Service and attracting more to become licensed operators, it should perhaps first determine why far less

than a majority of presently licensed United States amateurs are members of the National Association for Amateur Radio.

Respectfully Submitted,

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APPENDIX

Usage-Based Algorithm

$$W = N(k_1B_1 + k_2B_2 + k_3B_3 + k_mB_m) \quad Eq. 1$$

Where

W = Region 2 HF band amateur radio spectrum in kHz

N = number of channels possible in each band

k = Weighted fraction of use, relative to CW use, according to CTT data. SSB

= $k_1 = 1.75$; CW = $k_2 = 1.0$; Digital = $k_3 = 0.174$ (423/241.5, 241.5/241.5, and 42/241.5)

B = Bandwidth segment in kHz

Therefore, $W = N(1.75*3.5+1.0*0.5+0.174*1.0)$ or, $W = N(6.712)$

Or, $N = W/6.799$. Solving Eq. 1 for 160 through 10 Meters, one obtains the results in Table I for usage channelization, N, for each band. Multiplying N by the respective $k_m B_m$, yields a weighted band segment that should allotted to each mode.

TABLE I

Band	N	Nk_1B_1	Nk_2B_2	Nk_3B_3
160M	29.4	180	14.7	5.11
80M	73.5	450	36.8	12.8
40M	44.1	270	22.1	7.67
30M	7.35	45.0	3.68	1.28
20M	51.5	315	25.8	8.96
17M	14.7	90.0	7.35	2.56
15M	66.2	405	33.1	11.5
12M	14.7	90.0	7.35	2.56
10M	147	900	73.5	25.6

Adjusting the above slightly to comply with the total spectrum allotted to each band yields the following, based on CTT data:

TABLE II (kHz)

<u>Band</u>	<u>CW(0.5kHz)</u>	<u>Digital(1.0kHz)</u>	<u>SSB(3.5kHz)</u>	
<u>AM/FM(15kHz)</u>				
160M	15	5	180	
80M	40	15	445	
40M	20	10	270	
30M	5	5	40	
20M	30	10	310	
17M	10	5	85	
15M	35	15	400	
12M	10	5	85	
10M	75	25	900	700